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LETTERS PATENT

TYPE OF PATENT

☐ USEFULNESS MODEL ✕ INVENTION ☐ INDUSTRIAL DESIGN

IDENTIFICATION

PRIORITY	REGISTRATION	RECORD
COUNTRY: _____	No. 1397/92	No. 53,936
REGISTRY No. ____		DATE: 08-28-1992
DATE: _____	DATE: 08-28-92	EXPIRATION: 08-28-2012

DESCRIPTION

TECHNICAL TITLE OF THE INVENTION OR CREATION:

"METHOD TO PREPARE A DRILLING FLUID CONTAINING DISPERSED CARBON BLACK"

OWNER(S) AND ADDRESSES: SUN DRILLING PRODUCTS CORPORATION, a United States corporation, with headquarters in Bellechasse. :Louisiana, United States of America.

THE ABOVE OWNER HAS THE RIGHT TO USE, SELL, AND MANAGE THE OBJECT OF THE PRESENT INVENTION, A RIGHT THAT CAN BE TRANSFERRED TO HIS HEIRS AND ASSIGNS. THE STATE DOES NOT GUARANTEE THE ACCURACY, PRIORITY OR USEFULNESS OF THE INVENTION, PATENTED IMPROVEMENT, MODEL OR DRAWINGS. THE PERTINENT FEES WERE PAID PURSUANT TO RECEIPT No. 4118 OF 08-28-1992 THE FIRST ANNUAL INSTALLMENT (Bs. 100.00) AND PURSUANT TO RECEIPT No. 72466 OF 07-14-95 THE DOCUMENTARY TAX (Bs 4.00) AND PROTOCOL PAPER (Bs. 1.00) TOTAL Bs. 105.00 CARACAS AUGUST 01 OF 1996 SIGNATURE OF PARTY OF RECORD	FACSIMILE OF DRAWING OR INDUSTRIAL MODEL TITLE SUBSCRIBED ON 06/14/99 BY DR. FLOR MARIA ARVELO, REGISTRAR OF INDUSTRIAL PROPERTY, PURSUANT TO RESOLUTION No. 081 OF 04/30/98, OFFICIAL GAZETTE No. 36,456 OF 05/19/98 BY VIRTUE OF NOT BEING TIMELY SIGNED BY THE COMPETENT OFFICIAL. (AFFIXED WITH GLUE) /s/ Illegible [Rubber stamp of the Registry of Industrial Property of the Republic of Venezuela]

SUMMARY OF THE INVENTION

Therefore, an objective of this invention is to provide a new and improved method to apply carbon black based products to drilling fluid in order to reduce drastically the separation of said carbon black from the drilling fluid as it passes through a shaker apparatus.

In fact, this invention will permit 99.9% of this carbon black based material to pass through the screen of the shaker having a size of 200 mesh. This reduced screening allows the carbon black based material to remain in the drilling fluid system indefinitely and gives rise to a more economical and environmentally safer method to obtain the benefits of carbon black.

Another objective of this invention consists of providing a dispersion of carbon black that offers an improved distribution of the size of the carbon black particles.

Another objective of this invention consists in providing a method for adding the carbon black products to the drilling fluid in a way that the person who adds the product is not exposed to the find dust while adding it in dry form through the mud hopper on the drilling apparatus.

Another objective consists of improving the lubricating properties of the drilling fluid.

Another objective consists of improving the rheologic properties of the drilling fluid.

An additional objective consists of improving the foaming properties of the drilling fluid.

The process of this invention offers a superior method for predispersing and, therefore, wetting the surface area of the carbon black with a surfactant agent, emulsifier or dispersing agent before adding the product to the drilling fluid. This process provides a more uniform distribution of particle size of colloidal spherical particles as well as particles the size of 1 to 200 microns.

This invention solves the "fish eye" condition that occurs when the carbon black particles are added to the drilling fluid. The fish eye condition is the agglomeration of many ultrafine particles that could be partially dampened with water on the outside but are dry in the center of the sphere. The carbon black particle in fish eye is separated from the separation fluid by the apparatus shakers.

This invention improves the economy and efficiency of the defoamers. It is believed that the normally hydrophobic carbon black particle absorbs a film of liquid defoamer around the entire surface area of each carbon black particle. The normally hydrophobic carbon black particle is also organophilic and is dampened preferably with a hydrocarbon, generally an oil, alcohol or similar material. As this mixture or dispersion of carbon black and liquid hydrocarbon based defoamer is added, the carbon black particles are separated and quickly driven through the bubbles of the foam.

It is believed that these carbon black particles that are surface coated with the defoamer previously mentioned are driven over the surface of the water due to the hydrophobic nature of the carbon black particle coated with the defoamer. It is believed that this phenomenon is due to the extremely small size of the particles coated with carbon black and their lack of affinity for water. Since these coated carbon black

DETAILED DESCRIPTION OF THE INVENTION

We refer in detail to the preferred forms of the invention.

In accordance with this invention for the manufacture of a water based drilling fluid, the hydrophobic carbon black is mixed with a surfactant or dispersing agent. This mixture is then cut mechanically, sufficiently high and for a sufficient length of time to change the hydrophobic carbon black into hydrophilic carbon black.

In one form, the hydrophobic asphaltite is mixed with the hydrophobic carbon black and the surfactant or dispersing agent. Then, this mixture is cut mechanically sufficiently high and for a sufficient length of time to change the hydrophobic carbon black as well as the hydrophobic asphaltite into hydrophilic carbon black and hydrophilic asphaltite.

As a result, the surface area of the carbon black is dampened and is hydrophilic. This allow the carbon black to remain dispersed and separated into individual particles that pile up or are deposited on the side of the well hole to reduce fluid loss. These coated particles on the surface, finely dispersed, act as excellent plugging agents for improved control of fluid loss. Advantageous properties similar to the asphaltite when present are imparted.

In this invention, the carbon black particles and the asphaltite, if present, are in a state of dispersion with an average particle size much finer than its original size due to the cutting action in the environment of the surfactant or dispersing agent. In the present invention, the carbon black particles are in a state of dispersion having an average particle size much finer than the other drilling fluid additives. The carbon black additives

The mixture of carbon black and surfactant or dispersing agent is subjected to very high mechanical cut to impart hydrophilic properties to the carbon black. The mixture must be subjected preferably to a cut of at least 1700 rpm for at least 60 minutes. When present in the mixture, the hydrophobic asphaltite is subjected to a similar cut.

A typical method for cutting the liquid mixture is to use a high velocity mechanical disperser, such as the ROTOSTAT$^{(R)}$ 200XP-200 manufactured and sold by Admix, Inc., of Londonderry, NH, U.S.A.

As an option, the mixture that includes carbon black obtained after the cutting process can be adjusted to a pH of up to 8 before adding the drilling mud. The pH adjustment is a mean for additionally dispersing the solids of the invention in the liquid phase.

The carbon black is preferably used in an amount of 5% to 90% weight of additive mixture. It is especially preferred at 50% weight of carbon black in the additive mixture.

If a surfactant agent is used, the latter is used preferably in an amount of 5% to 90% weight of the additive mixture. It is essentially preferred at 35% weight of surfactant agent in the additive mixture.

If a dispersing agent is used, it is used preferably in an amount of 1% to 50% weight of additive mixture. More or less 10% weight of the dispersing agent in the additive mixture is especially preferred.

In one form, the additive material includes also asphaltite in an amount of 5% to 80% weight of the mixture. 40% - 70% of the weight of the asphaltite in the additive mixture is especially preferred.

TABLE 1

DECREASE OF WATER LOSS AT HIGH AND LOW PRESSURE
ADDITIVE ONLY CARBON BLACK VERSUS COMBINED ADDITIVE OF CARBON BLACK & ASPHALTITE

	BASE MUD	2% PER VOLUME OF CARBON BLACK AS ONLY ADDITIVE	IMPROVE-MENT PERCENTAGE	2% PER VOLUME OF COMBINED ADDITIVE OF CARBON BLACK AND ASPHALTITE*	% OF IMPROVEMENT OF BASE LOAD
100 psi of fluid loss at 80°	25.6 cc	15 cc	41%	10.5 cc	59%
500 psi of fluid loss at 300°	69.5 cc	31.8 cc	54%	22 cc	68%

*Known as BLACKNITE™ more or less 30-40% dry weight of carbon black and 70-80% dry weight of asphaltite.

EXAMPLE 1

Improved fluid loss at high pressure and temperature and improved fluid loss at low pressure.

The fluids in Table 1 were circulated 25 times through a screen of 100 mesh, and later tests were conducted on the fluids in accordance with Table 1.

EXAMPLE 3

Improved lubrication of the drilling fluid—carbon black

TABLE 3

LAYER PRESSURE (lbs)	BASE MUD (amperes)	ADDITION OF 2% INVENTION (amperes)	PERCENTAGE OF REDUCTION
100	14	5	64%
200	26	9	65%
300	35	15	57%
400	44	21	52%
500	60	31	48%
600	RETENTION	44	W/O RETENTION.

Lubricity refers to the characteristics of lubrication of the drilling fluid in contact with the drill bit and the walls of the well hole. The lubricity of the drilling fluid was measured by the capacity thereof to reduce the coefficient of friction between two surfaces, with the drilling fluid between them. This invention reduces lubricity due to the formation of a film between the surface while the accumulation of the wall cake is reduced.

EXAMPLE 4

Stability of the properties of the fluid with regard to the temperature of the drilling fluid—carbon black.

The following results were obtained in Table 4 with the use of 13.5 ppg of water based drilling fluid.

invention on the condition that they fall within the scopes of the final claims or their equivalents.

10. A process for the manufacture of an additive for water based drilling fluid in accordance with claim 1, where the surfactant or dispersing agent is a liquid.

11. An additive for water based drilling fluid prepared in accordance with claim 1.

12. A process for the manufacture of an additive of water based drilling fluid in accordance with claim 1, where the mixture of step (a) is cut by mechanical cut of at least 10,000 /sec for at least 1 hour.

13. An additive for a water based drilling fluid prepared in accordance with claim 12.

14. A process for the manufacture of an additive for a water based drilling fluid in accordance with claim 1, where the mixture of step (a) is cut by a mechanical cut of at least 10,000/ sec. for at least 2 hours.

15. An additive for a water based drilling fluid in accordance with claim 14.

16. A process for the manufacture of an additive for a water based drilling fluid in accordance with claim 1, where the mixture of step (a) is cut with a mixer having a speed at the propeller bit of at least 40 feet/ sec. and the mixture of step (a) is cut by mechanical cut of at least 10,000 /sec. for at least 1 hour.

17. A process for the manufacture of an additive for a water based drilling fluid in accordance with claim 1, where the mixture of step (a) is cut with a mixer having a speed of at least 40 feet/ sec at the propeller bit, and the mixture of step (a) is cut by mechanical cut of at least 10,000/ sec. for at least 2 hours.

is selected from a group consisting of potassium hydroxide, sodium hydroxide and lignite type materials.

25. A process for the manufacture of an additive for a water based drilling fluid, in accordance with claim 24, including also the addition of hydrophobic asphaltite to the mixture in step (a) and the cut in step (b) of the hydrophobic asphaltite to change it into hydrophilic asphaltite.

26. A process for the manufacture of an additive for a water based drilling fluid, in accordance with claim 25 where the asphaltite is Gilsonite.

27. An additive for a water based drilling fluid prepared in accordance with claim 26.

28. An additive for a water based drilling fluid prepared in accordance with claim 25.

29. An additive for a water type drilling fluid prepared in accordance with claim 24.

30. An additive for a water based drilling fluid including hydroxylic carbon black and a surfactant or dispersing agent.

31. An additive for a water based drilling fluid in accordance with claim 30, including also hydrophilic asphaltite.

32. An additive for a water based drilling fluid, in accordance with claim 31, where the asphaltite is Gilsonite.

33. A water based drilling fluid, consisting of water and an additive for a water based drilling fluid, in accordance with claim 32.

42. A water based drilling fluid consisting of water and an additive for water based drilling fluid in accordance with claim 30.

43. A process for improving the properties of a drilling fluid during the drilling of a well consisting of the steps to combine and circulate, together with the water based drilling fluid an additive in accordance with claim 30, which is mixed with the drilling fluid in an amount adequate to reduce sufficiently the fluid loss and the thickness of the wall cake.

44. A process for drilling a well with a rotary bit, which consists of cutting a well hole with said bit while the drilling mud is made to circulate through the well hole; said drilling mud consists of an additive in accordance with claim 30; said additive is mixed with the drilling mud in an amount adequate to reduce sufficiently the fluid loss and the thickness of the wall cake.

45. An additive for water based drilling fluid in accordance with claim 30, where the surfactant agent is selected from a group consisting of phenols, alcohols, glycols and fatty acid type materials, and said dispersing agent is selected from a group that consists of potassium hydroxide, sodium hydroxide and lignite type materials.

46. An additive for a water based drilling fluid in accordance with claim 45, consisting in addition of hydrophilic asphaltite.

47. An additive for a water based drilling fluid in accordance with claim 46, where the asphaltite is Gilsonite.

48. A water based drilling fluid consisting of water and an additive for water based drilling fluid in accordance with claim 47.

SUMMARY

A process for the manufacture of an additive for water based drilling fluid consisting of the following steps: (a) mixing hydrophobic carbon black and a surfactant or dispersing agent, and (b) shaking the mixture of step (a) at a mechanical cut that is sufficiently high and for a time also sufficient to change the hydrophobic carbon black into hydrophilic carbon black. This invention refers as well to an additive for a water based drilling fluid prepared in accordance with the preceding process and the use of an additive in a water based drilling fluid.